Art. VIII.—*The Graptolite Beds at Daylesford.*

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(With Plate XII.).

[Read 11th June, 1908].

During the last few years, on several visits to Daylesford I have collected fossils at a large number of localities. Many of these have kindly been examined and identified by Dr. T. S. Hall, and the horizon of the beds determined. The greater part of the collecting has been done between Sailor's Creek, on the west, and the line of the Dry Diggings Road, on the east, extending north and south over a distance of about six miles, with Daylesford in the centre. The following notes are a summary of the information obtained at about sixty fossil localities.

Previous References.

A geological survey of about 140 square miles in the vicinity of Daylesford was commenced by Krause, and a progress report dated Oct. 1, 1877, is contained in Progress Report No. 5 of the Geological Survey of Victoria. He states that it is apparent from the persistent westerly dip between the Loddon and Daylesford, that the uppermost beds are exposed on or in proximity to the meridional ridge, of which Wombat Hill forms a conspicuous point; that thence westward the beds are much folded and fractured, and with these beds the principal auriferous quartz reefs are associated; that graptolites are abundant in these "upper" beds; and that the general strike of the beds near Wombat Hill is 16 to 22 degrees west of north, but that further north it becomes more meridional. The only fossils mentioned are Graptolites fruticosus and Phyllograptus folium, which are stated to be the most common species.

The survey was subsequently continued by the late Norman Taylor, whose report is contained in Progress Report No. 8 of the

Geological Survey. He states that he has not noticed the persistent westerly dip between the Loddon and Daylesford, referred to by Krause. He mentions several fossil localities, four of which are marked on his map, but gives no further names except Hymenocaris. His map is published as quarter-sheet 16 N.E.

The area to the south, of which the map is quarter-sheet 16 S.E., was surveyed by Mr. S. B. Hunter. The report is in Progress Report No. 9 of the Geological Survey. He mentions the occurrence of graptolites, and states that both east and west of the most folded belt there is a persistent dip to the west.

Dr. T. S. Hall, in his paper on the Geology of Castlemaine (Proc. Royal Society of Victoria, Vol. VII., new series, 1895) refers the only Daylesford fossils which he had then seen to the zone of Tetragraptus fruticosus. Referring to this in a paper dealing with other features of these rocks (Proc. Royal Society of Victoria, Vol. XIV., pt. 2, n.s.), I mention them as the lowest parts of the Castlemaine series, meaning thereby the lowest parts of the rocks which occur at Castlemaine, not the Castlemaine series in the more limited sense in which that term is now commonly used.

More recently Dr. Hall has identified other fossils from this district (Records Geological Survey of Victoria, Vol. I., pt. 4, 1906, and Vol. II., pt. 1, 1907), of which the localities and horizons are as follows:—

Cornish line of reef (stated by Mr. E. J. Dunn to be from the mullock heap at the Victoria Cornish Engine Shaft, and probably from the 966ft. level), at the top of the Bendigo series.

The Springs, Daylesford, Bendigo horizon.

Bullarto, Castlemaine horizon.

From the Daylesford Gold Mine Tip, probably Bendigonian, and others from the same locality, Wattle Gully Beds. Mr. W. Baragwanath, jr., who collected these, considers that they were both probably from material excavated in sinking from 400 to 500ft.

From a shaft quarter mile south of the Cornish Co.'s new shaft, Castlemaine series.

From the north side of the Jubilee Lake, quarter mile east of the railway, Upper part of the Castlemaine series. Mr. Barag-

wanath informs me that these were from material from a tunnel. From his information, also, I make a slight verbal correction in the last two localities.

Mr. E. J. Dunn refers the beds mainly to the Castlemaine zone, but in part to the Bendigo zone. This is apparently largely by the weathering colours (Records Geological Survey of Victoria, Vol. II., pt. I., p. 10).

General Outline of the Following New Observations.

I have divided the area into three. My western localities are from about the line of the strike passing through the Ajax Mine, westward. All my fossils from these localities are referable to the Bendigo series, but the localities are widely scattered, and the field relations of the beds to one another are seldom ascertained.

Central Belt.—In this the rocks are often well exposed and much folded. Most of my observations are in this area. Bendigo beds occur on its west side, and probably recur on anticlines further east, associated with the Wattle Gully series, but no higher beds have been demonstrated.

Eastern Localities.—These are scattered localities east of the Ballarat Railway, near Woodburn, and eastward from the Springs at Hepburn, and one far east locality. In these also the field relations of the beds are not observed. All the fossils are referable to parts of the Castlemaine Series above the Wattle Gully Beds.

I have numbered my fossil localities in order for facility of reference, and described their positions in terms which allow of their being readily located. The fossils identified by Dr. Hall and his statements as to horizon I have marked thus: †. The remainder of the names, confined almost entirely to common forms, are from my own notes.

Details of the Fossil Localities.

Western Localities.

In the Deep Creek at Eganstown black pyritic slates occur, but no fossils were obtained.

1.—On the Ballarat Road, west of the turn of the road at which small dykes are marked on Hunter's map, and near the top of Sailor's Hill, in a small cutting on the south side of the road. Tetragraptus fruticosus, Didymograptus bifidus, and Phyllograptus typus.

2.—In the cutting at the west end of the Sailor's Creek embankment, Ballarat Road. Strike north 10 degrees west, dip easterly at 73 degrees, near an anticline. The same three species with small crustacea.

The horizon of these will be high in the Bendigo Series.

3.—On the east side of Sailor's Creek, on the low point opposite the Tipperary Spring. This is the spring marked on Taylor's map a short distance upstream from Tipperary Point. Phyllograptus typus,†, Tetragraptus bryonoides,†, T. pendens,†, Goniograptus thureaui, variety with five branches,†, and another Goniograptus,†, Didymograptus cf. nicholsoni.†, Rhinopterocaris.

Strike north 20 degrees west, dip easterly. A syncline is close by to the east, but the easterly dip is quickly resumed. An anticline occurs a short distance to the west.

4.—East bank of Sailor's Creek opposite Taylor's note 30. Tetragraptus fruticosus,†, T. quadribrachiatus,†, Bendigonian,†, Rhinopterocaris maccoyi and smaller crustacea are also present.

5.—Close to 4. Tetragraptus pendens,†, T. bryonoides,†, Goniograptus thureaui,†,. Dr. Hall refers it doubtfully to the upper part of the Bendigonian. I have also T. fruticosus and Phyllograptus typus. The bed is probably identical with 4, and quite close to 3, so that all these three localities may be referred to the Bendigonian.

6.—Taylor's note 24. Dip westerly. Tetragraptus fruticosus,†, T. serra,†, T. bryonoides,†, T. quadribrachiatus?,†, Phyllograptus typus,†, Goniograptus macer,†, Typical Bendigonian,†, Crustacea are very common, some of which Mr. F. Chapman has identified as Caryocaris cf. angustata.

7, 8.—At the present Ajax shaft, and at an old shaft close by, Tetragraptus fruticosus. This is at the site of Taylor's note 31.

9.—At a shallow shaft between the Ajax and Nuggetty Ajax shafts, T. fruticosus with Phyllograptus typus. These three localities were all in loose blocks from the shafts.

10.—On the right bank of Wombat Creek, near the west boundary of the borough. T. fruticosus is probably present. This seems to be probably the locality referred to above as the Springs, Daylesford.

11.—In east dipping beds east of the south-east corner of the Stony Creek Basin, and west of allotments 28, 29; in a race cut in the bedrock in an area of sluiced ground. Tetragraptus fruticosus,†, T. serra, Phyllograptus typus,†, Goniograptus sp. Rhinopterocaris maccoyi, and smaller crustacea. Bendigonian.†.

An anticline passes a short distance to the west of this locality, and is perhaps the same as that which passes west of the Ajax shaft.

12.—From a shaft near Stony Creek Falls, in poorly preserved material, Phyllograptus typus.

13.—In the bed of Sailor's Creek, about west of the last mentioned locality a few fossils were found, but nothing recognisable.

The localities from which the above fossils were collected are too few and widely separated to give a safe idea of the whole of the beds present. They are in the Bendigo series, and the more western localities, 1 to 5, high in that series. They do not require any great thickness of beds, and do not suggest a persistent westerly dip. I know of no records of newer fossils to the west. A slight prevalence of westerly dips is possible.

The Central Area.

Besides being more accessible, this area affords numerous natural sections, road cuttings, sluiced areas, shafts, tunnels, and other workings.

A nearly continuous section may be obtained from 11 down a gully to Wombat Creek, and a little further to the north up the Smith's Creek valley.

About 75 paces to the east from 11, measured across the direction of the strike, a roll occurs in the strata, but the easterly dip is at once resumed, and continues to a syncline near the north-west corner of allotment 27.

14.—In the bed of the gully, and west of the syncline, Didymograptus bifidus,†, a few Phyllograptus typus,†, Tetragraptus bryonoides,†, T. serra,†, T. quadribrachiatus,†.

15.—East of the syncline, perhaps the same bed, Didymograptus bifidus,†, D. extensus,†, Rhinopterocaris maccoyi,†.

Both these are Wattle Gully Beds,†.

Thence to the mouth of the gully the dips are westerly, though in some places difficult to observe in the thick, highly cleaved slates. The anticline must occur just outside this gully, and can be seen a short distance to the north, in an excavation on the east side of the Ballan-road, at the south end of the embankment over Wombat Flat. The anticline has a well-marked pitch to the south, and some thin quartz veins seem to follow round the beds and outcrop in curved lines on the floor of the excavation.

16.—At the south end of this cutting, and immediately east of the anticline, Phyllograptus typus is the most abundant, and Tetragraptus fruticosus is doubtfully present. Didymograptus bifidus was not noticed.

In the bed of the creek to the east the syncline is just exposed, and shows black slates from which it was difficult to obtain any fossils.

17.—A little to the south, in the bed of the creek, a very few fossils were obtained, comprising Didymograptus bifidus, Phyllograptus typus, and probably Tetragraptus serra. The horizon is therefore uncertain. It may be uppermost Bendigonian or Wattle Gully Beds.

Continuing to the east up Smith's Creek, an anticline and a syncline closely following are seen a little east of the Lake Road. Both these have a strong southerly pitch. Thence westerly dips continue to an anticline which passes under the hill on which the Victorian Cornish south shaft is situated. This anticline is easily traceable up the south side of the valley, and passes immediately east of the South Cornish Company's shaft. Continuing to the south it crosses the railway at the footbridge, but is not actually seen, as an old valley filled with basalt occupies the position where it would appear. The change of dip is clearly seen on the two sides of this valley, the whole width of which is exposed in the cutting.

18.—In the mouth of a small tunnel on the north bank of Smith's Creek, and a little east of the anticline. In my notes I have that Phyllograptus typus is most abundant with doubtful Tetragraptus fruticosus, but none of the material sent to Dr. Hall was determinable.

19.—From loose material here, Phyllograptus typus,†, Tetragraptus bryonoides,†, either Castlemainian or Bendigonian,†.

20.—South Cornish Company's mullock heap, T. fruticosus,†, Bendigonian.

This anticline, like the previous one, has a southerly pitch.

21.—West of the last mentioned anticline, in a gully north of Smith's Creek and independent of it. North-west of the south shaft of the Victorian Cornish Co., Tetragraptus fruticosus, Phyllograptus typus, Rhinopterocaris and small crustacea.

22.—East of the anticline last mentioned, north-east of 18 and high up on the north side of Smith's Creek, in east dipping beds. A trench had been cut along the next bed with the fossil bed on its wall, so that large quantities of material were available. Tetragraptus bryonoides,†, Didymograptus cf. nicholsoni,†, Clonograptus flexilis?,†, Clonograptus spp,†, Phyllograptus typus†, age uncertain, probably Bendigonian,†. I noticed no examples of either Tetragraptus fruticosus, Didymograptus bifidus or D. caduceus.

23.—A few fossils were noticed in slightly newer beds a short distance down the hill from 22.

It appears, therefore, that Bendigo Beds do reach the surface on this anticline. I was formerly under the impression that they did not, as my first Bendigonian fossils in this vicinity were all from mine mullock heaps.

24.—A loose block containing Tetragraptus fruticosus was found on the Lake road, near the long tunnel. Its origin is quite uncertain, owing to the great length of this tunnel, but in in view of the southerly pitch of the anticline near the last localities, Bendigo beds would scarcely be expected on the surface near this tunnel on it, and there is no sign as yet detected of their appearance further east. There is, of course, the possibility that the tunnel workings have at their entrance re-handled shaft material, or that the block may have not come from the tunnel at all.

Higher up Smith's Creek the dip is for some distance easterly from the localities 18 and 22. A syncline with an anticline quickly following on the east, appears, and further east the bedrock is buried under basalt.

East of the South Cornish shaft, an anticline is exposed both in

the road and railway cuttings. Where it would be expected in Smith's Creek I found no break in the easterly dips. The strike of locality 22 would pass close to or east of this anticline. The anticline is broadly curved.

25.—East of this anticline in the road cutting east of the railway. Didymograptus bifidus,†. Phyllograptus typus,†, Tetragraptus serra,†, T. bryonoides,†, T. quadribrachiatus,†, Clonograptus or Dendrograptus sp,†, Castlemainian, Wattle Gully Beds,†.

From the locality 11 to the head of the exposed Ordovician in Smith's Creek is a distance at right angles to the strike of about three-quarters of a mile. From the syncline between 14 and 15 to the anticline at 19, there is a preponderance of westerly dips to the extent of about 1200 feet, and some of the short stretches of easterly dip have a comparatively flat dip for some part of their length. There may be in all 1000 feet in thickness of beds exposed, the lowest of which are Bendigonian and the highest Wattle Gully.

Between 11 and 14 there is not room for the whole of this series to be repeated in the distance of about eight or nine chains, yet the beds at 11 appear to be at least as old as those at 19. Similarly between the South Cornish shaft and the anticline at the railway crossing there is only a distance of about three or four chains, yet beds appear which are of the Wattle Gully series and probably not far removed in age from the beds at 14 and 15.

The most probable explanation seems to be that there is unobserved faulting at both these places, with an upward movement on the west side, so that some beds are cut out of the surface section. As these would probably be reversed faults, their direction would be similar to those on which the Cornish and the Ajax reefs are situated.

If such faults recur at other parts of the district, they would counteract a preponderance of westerly dips, as they actually do in this section, and would therefore tend to reconcile the statements of Hunter and Krause as to prevalent dips, with the evidence of the fossils.

An attempt was made to trace the folds of the Smith's Creek section in the railway cuttings and other exposures to the south.

The anticline and syncline at the lower end of Smith's Creek appear to converge to the north and spread apart to the south. On the north bank of the Lake two anticlines are probably present corresponding to those at 19, and perhaps 25. An anticline occurs at the Woodburn siding, exposed in a drain near the road crossing. A syncline occurs at the north end of the big bank to the south, and the big cutting beyond shows an anticline and syncline. Fossils were obtained at several places.

26, 27.—In the two cuttings between the Lake and Woodburn. Only Tetragraptus serra from one of these, and Phyllograptus typus from the other, were recognised.

28.—At one of the mullock heaps of the Rising Star (now Victorian Star) mine. Phyllograptus typus and Tetragraptus fruticosus. The shaft is 750 feet deep, and they are probably from the lowest workings.

29.—In the bed of the Creek above the big embankment south of Woodburn, a few fossils were noticed, but were indecisive as to the horizon of the beds.

30, 31, 32.—Three localities in the big cutting. At all of these Didymograptus bifidus† is by far the most abundant fossil. In addition there are Tetragraptus bryonoides† and Phyllograptus typus† at 30 and 32, and T. quadribrachiatus† at 32.

30.—At the north end of the cutting east of the anticline.

31.—Beyond the anticline, but before the syncline.

32.—Near the south end of the cutting, west of the syncline.

These are all near the same horizon, and the same bed may be repeated. All are Wattle Gully Beds.

This anticline seems to be most probably the same as passes west of 11. No Bendigo Beds are exposed in the cutting, but their disappearance is in accordance with the consistent southerly pitch seen on the anticlines and synclines as before mentioned. If the identification of the anticline is correct, one anticline and one syncline seem to disappear southward from the series before described.

33.—A few fossils were obtained in Wombat Creek, a little above the Lake Road Bridge. Their horizon was uncertain, but the beds are probably the same as at 17.

34.—In Kidd's Gully east of the Daylesford Co.'s shaft, one small Didymograptus caduceus.

35.—Lower down Kidd's Gully, north-east of the same shaft. Tetragraptus fruticosus is doubtfully present.

36.—A short distance upstream from the junction of Whitefield Gully and Kidd's Gully. A few fossils were obtained, among which Didymograptus bifidus was most common.

37.—In Spring Creek, at the mouth of Wild Cat Gully, Phyllograptus typus was observed.

38.—Road cutting on the Hepburn Road west of Doctor's Creek. Phyllograptus typus,†, Tetragraptus bryonoides,†, and sponge spicules,†, Horizon uncertain,†.

A good series of sections are exposed from the locality 6 downstream to the junction of Spring Creek and thence up Spring Creek and Woman's Gully.

An anticline with a strong northerly pitch occurs a short distance east of 6, followed by a syncline with a similar pitch, and another anticline. This syncline and anticline cross the creek twice in the bend south-west of the Hepburn recreation ground, and also cross Spring Creek just above its junction with Sailor's Creek.

39.—Close to the syncline west of the recreation ground. Didymograptus bifidus.

40.—On the west bank of the Creek, and west of the syncline, and north-west of the recreation ground. T. fruticosus,†, Bendigonian,†.

41.—On the west side of Sailor's Creek and opposite the mouth of Spring Creek. Tetragraptus fruticosus,†, T. bryonoides,†, Phyllograptus typus,†, Didymograptus bifidus?,†, Clonograptus abnormis,†, Bendigonian uppermost zone,†, Rhinopterocaris maccoyi and other crustacea are also present. Immediately to the south there is considerable mixing of these slates with the sandstones, giving something of the appearance of a conglomerate.

As the pitch is northerly and the beds are near a syncline and some distance north from the locality 6, they would be expected to be somewhat newer, as is also indicated by the fossils.

After the syncline and anticline already referred to as crossing Spring Creek there is for some distance up that creek an easterly dip. A syncline occurs before reaching the road, and an anticline immediately east of the road embankment at Breakneck.

42.—Road cutting south of Spring Creek at Breakneck, west of the anticline. Didymograptus bifidus,†, D. caduceus one small,†, Tetragraptus bryonoides,†, Phyllograptus typus most abundant,†, sponge spicules,†, Wattle Gully Beds,†.

43.—In bed of creek east of the same anticline. Didymograptus bifidus,†, most abundant, D. extensus,†, Tetragraptus bryonoides,†. Wattle Gully Beds.†

These two localities are in beds close to one another, and as easterly dip have been in excess from the last fossil locality, we would expect higher beds, as is indicated by the fossils.

A syncline soon follows, and an anticline after some distance, which should bring up slightly older beds than 42, 43, but no fossils were obtained to show whether the Bendigo beds reach the surface again. Four more anticlines were located further east, but no more fossils were found.

On the whole the northern localities show a succession of folds with Wattle Gully Beds east of the localities of Bendigo fossils, and a slight prominence of an anticline corresponding in character to the anticline at the Cornish mine.

At two or three places in this central area somewhat coarser sandstones than usual were noticed at a position which was probably near the dividing line between the Bendigo and Wattle Gully beds, but the evidence was not sufficient to regard them as being restricted to this part of the series.

The Eastern Localities.

44.—Bed of Wombat Creek, quarter mile east of the head of the Lake. Didymograptus caduceus, some large.

45.—At a shallow shaft a short distance to the south from this. D. caduceus,†, large. Castlemainian,? middle,†.

These are further east than Baragwanath's locality.

46, 47, 48.—Three localities in Argyle Gully. D. caduceus was found at two of them, and Phyllograptus typus at the middle one, near an anticline.

49.—On the ridge north of Argyle Gully, and east of Spring Creek. Didymograptus caduceus,† and Phyllograptus angustifolius,†.. Typical Castlemaine series,†.

50.—On the ridge between Wild Cat and Woman's Gully, about 50 chains east of Spring Creek. Didymograptus caduceus,†.

very abundant, Phyllograptus angustifolius,†, and Dichograptus octobrachiatus?,†.

51.—On the same ridge and about 25 chains to the north-east. Didymograptus caduceus large,†.

52.—East side of a cutting on the Dry Diggings road, south of Dry Diggings. D. caduceus,†.

53.—Mullock heap of a shaft near Beehive Reef Dry Diggings. D. caduceus,†, D. nitidus,†, and Phyllograptus angustifolius,†.

54.—Taylor's note 91. D. caduceus,†, D. nitidus,†, and Tetragraptus quadribrachiatus,†.

49 to 54 Dr. Hall refers to the typical Castlemaine series, and 51 probably highest. 51 is about the position at which Krause placed the highest beds. I have no information with regard to these localities, as to their relation to one another, and whether they are the higher or lower beds in their immediate vicinity. Between 52 and 54 there is a belt about a mile and a-half in width, from which I have no fossils. I do not think it likely that the trough of a main syncline lies at 51, as there is no reappearance yet detected of the Wattle Gully and Bendigo Beds to the East.

The principal gold workings in quartz are within the central strip or on its margin. This is within the limits which Dr. Hall regarded as gold-bearing at Castlemaine. There is little gold working to the east, where higher beds of the Castlemaine series probably occur. Though the western area has not much important mining at present, it is to some extent gold-bearing, and may correspond to one of the less productive zones which occur even in the Bendigo central area.

The prevalent southerly pitch at the south end, and prevalent northerly pitch at the north end bring in newer beds across the strike of the Cornish anticline, and cause these beds also to encroach on the area of Bendigo beds further to the west.

SUMMARY.

In the above notes I have referred the various beds to horizons in accordance with Dr. Hall's subdivision of the series of beds at Castlemaine. In view, however, of the differences in the fossil succession, as described by him from that noticed in other

countries, a review of the observations, independently of any such subdivision, seems desirable.

Having regard to the prominence of the various fossil species, as observed in collecting, the following characteristics of different beds are noticed:—1. There is a series of beds in which *Didymograptus caduceus* is abundant and sometimes large, often the only fossil collected. With it are *Phyllograptus angustifolius* and *Didymograptus nitidus*, neither of which I found in other beds, and *Tetragraptus quadribrachiatus*, which also occurs in other beds.

2nd. There is a series of beds characterised by the extreme abundance of *Didymograptus bifidus*, with which *Phyllograptus typus* is often common, *T. bryonoides* and *T. quadribrachiatus* being the most frequent other fossils in these beds.

3rd. In the remaining localities (excluding those from which the observations are too meagre to be safe), *Phyllograptus typus* is usually common, and practically always present. Other most frequent fossils are *Tetragraptus fruticosus* and *T. bryonoides*. *D. bifidus* is seldom present, and never common in these beds, and *T. fruticosus* was never observed in beds in which D. bifidus is common.

4th. At one locality, 22, with *P. typus* and *T. bryonoides*, *Clonograptus* was conspicuous, but neither *T. fruticosus* nor *D. bifidus*, nor *D. caduceus* was noticed here.

As regards the relations of these beds:—That locality in which *Clonograptus* is conspicuous is clearly just above beds containing *T. fruticosus*.

The *bifidus*-beds at 14 and 15 lie close to a syncline. Beds with *fruticosus* appear near the anticlines, on both sides of them, at 11 and 16.

The *bifidus*-beds at 30, 31, 32 lie near an anticline and syncline. Whichever of the anticlines this is, it is one on which *T. fruticosus* appears further north, and the pitch is southerly.

The *bifidus*-beds at 25 would appear, apart from possible faulting, to be near the horizon of the surface beds at the South Cornish shaft. From the workings of this shaft *T. fruticosus* was obtained, and further north on the anticline which passes close to the shaft, the same fossil also occurs in beds exposed at a much lower level in the gullies. The pitch of this anticline is considerable, and southerly.

The *bifidus*-beds at 42 and 43 are east of the *fruticosus* beds at 41, with some excess of easterly dips intervening.

In every case, then, where the relations of the *bifidus* and *fruticosus* beds are observed, the *bifidus* beds are the newer.

The field relations of the *caduceus* beds were not so well observed, but the following points seem important:—

D. caduceus was never conspicuous in the localities in which *D. bifidus* is abundant, and was never noticed present with *T. fruticosus*. Easterly dips prevail east of the anticline at 18 to the head of Smith's Creek. Anticlines and synclines near here have a distinct and consistent southerly pitch. The *caduceus* localities 44 and 45, and Mr. Baragwanath's locality lie to the south-east from here.

No repetition of the *fruticosus* beds occurs between the eastern localities with *caduceus*, and the furthest east localities with abundant *bifidus*.

No repetition of the *caduceus* beds occurs to the far west in any of the localities examined.

The *caduceus* beds without *typus* certainly cannot be placed between the *bifidus* and *fruticosus* beds, in both of which *typus* is abundant, and the field evidence is too complete also to suppose they had been overlooked in this position. They must either be below the *fruticosus* beds or above the *bifidus* beds. All the field evidence favours the higher position.

Of the three groups of beds the order then is:—

3rd. Beds with abundant *D. caduceus*, newer than

2nd Beds with abundant *D. bifidus* and with *P. typus*, newer than

1st Beds with *T. fruticosus* and *P. typus*. Oldest here observed.

This is in agreement with the determinations at Castlemaine already referred to, but I have not here collected in beds which can be decisively referred to that part of the series in which *D. caduceus* has begun to be common and *P. typus* has not yet disappeared. On the other hand, there are apparently beds at Daylesford, above the horizon at which *T. fruticosus* ceases to be common, but older than the beds with abundant *D. bifidus*. This may be only a local unimportant peculiarity of the bed in which the fossils were collected at locality 22.

Tabulation of the fossils observed at the chief localities. The beds grouped together are close to one another, and separated by not many feet in thickness of strata.

——	2	3 4 5	6	11	16	18	20	21	22	41	14 15	25	30 13 32	42 43	44 45	50	53	54
T. fruticosus	x	x	x	x	?	?	x	x	-	x	-	-	-	-	-	-	-	-
T. bryonoides	-	x	x	-	-	-	-	-	x	x	x	x	x	x	-	-	-	-
T. serra	-	-	x	x	-	-	-	-	-	-	x	x	-	-	-	-	-	-
T. pendens	-	x	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T. quadribrachiatus	-	x	?	-	-	-	-	-	-	-	x	x	x	-	-	-	-	x
P. typus	x	x	x	x	x	x	-	x	x	x	x	x	x	x	-	-	-	-
P. angustifolius	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	x	-
Dichograptus octobrachiatus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	?	-	-
C. flexilis	-	-	-	-	-	-	-	-	?	-	-	-	-	-	-	-	-	-
C. abnormis	-	-	-	-	-	-	-	-	-	x	-	-	-	-	-	-	-	-
G. thureaui	-	x	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G. macer	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Did. bifidus	x	-	-	-	-	-	-	-	-	?	x	x	x	x	-	-	-	-
D. cf. nicholsoni	-	x	-	-	-	-	-	-	x	-	-	-	-	-	-	-	-	-
D. extensus	-	-	-	-	-	-	-	-	-	-	x	-	-	x	-	-	-	-
D. caduceus	-	-	-	-	-	-	-	-	-	-	-	-	-	x	x	x	x	x
D. nitidus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	x